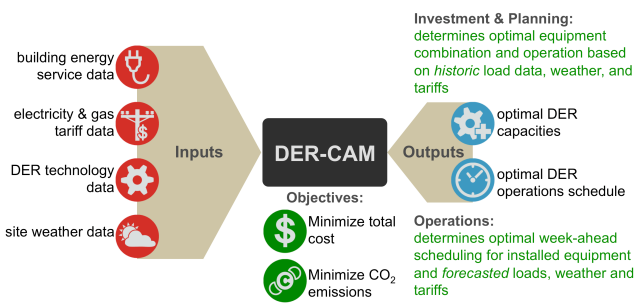
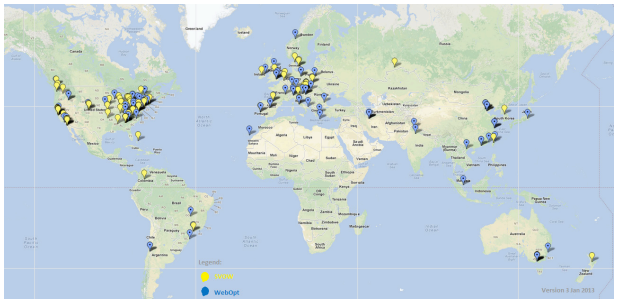
Microgrid Research at Berkeley Lab

The microgrid experts at Berkeley Lab study customer adoption patterns of grid technology and distributed energy resources (DER) optimization. The core focus is on U.S. projects, but we also analyze projects worldwide. Since 2000, we have been developing the Distributed Energy Resources Customer Adoption Model (DER-CAM). DER-CAM is a tool that, given the customer's energy profile, prevailing market information, and DER technology information, outputs results that minimize the cost of operation or emissions. The graphic on the left shows a high level schematic of the model and the right one the worldwide users of different DER-CAM versions.





Selection of Current Projects

V2G

We are partners with Bosch and Akuacom in a ~40-vehicle 100% PEV vehicle-to-grid demonstration project at the Los Angeles Air Force Base. Several key capabilities and requirements of cost effective all-electric fleets will be addressed, including:

- optimization of scheduling dis/charging such that energy costs are minimized and the benefits from participation in DR and ancillary services markets are jointly considered and the best overall bids submitted and scheduling implemented;
- receipt and fast response to grid instructions as well as settlement of revenues from grid service provision will be enabled through use of the OpenADR protocol; and
- integration of PEVs into the wider base energy system and analysis of their potential role in base microgrids, which bridges this project to another key DoD security objective.

California CHP Potential in 2030

One of the goals of this project is to stimulate economic and environmentally sound natural gas-fired CHP and CCHP adoption in California's medium sized commercial building sector. For this work, we:

- developed multiple scenarios that reflect grid decarburization, changes in equipment performance, and regulatory environment; besides CO_2 emissions NOX emissions will be considered
- considered zero net energy buildings and their impact on CHP and CCHP
- considered different feed-in tariffs and the impact of CO_2 pricing and cap and trade on CHP/CCHP adoption
- This analysis will not be done in isolation and will consider other distributed energy resources (DER) technologies as PV, solar thermal, electric and heat storage, which can be in competition with CHP and CCHP or supplement each other, depending on the building type and DER adoption strategy.

Web-Optimization of Distributed Energy Resources (WebOpt)

This tool aims to provide a fully accessible web service that users can employ to evaluate potential Distributed Energy Resources (DER) options.
http://microgrid.lbl.gov/der-cam/how-access-der-cam

Microgrid Symposiums

In addition to research, we also organize the annual microgrid symposium series, now in its 9th year, where leading experts in academia, industry, and governments meet with the goals of examining microgrid research and demonstration results from around the world, and to identify areas of potential international cooperation.

Current Research Partners

Honeywell, Bosch Software Innovations, C3 Energy
NEC Labs America, University of New Mexico
U.S. Air Force, Public Service New Mexico, Demand Energy Networks

BERKELEY LAB
Contact: Chris Marnay
Email: ChrisMarnay@lbl.gov
Tel: 510-486-7028
Contact: Michael Stadler
Email: MStadler@lbl.gov
Tel: 510-486-4929

2013-May-25